

Causal Social Mechanisms; the why not just the how.

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ABSTRACT

Over 40+ years of research in the IMP tradition has resulted in a variety of different kinds of published outputs ; data, information, knowledge, concepts, stories, models, case studies, frameworks and even some things that we might like to call theories. The espoused objective of all this research is better understanding of the phenomenon of interest; industrial networks. However the nature and quality of those understandings varies enormously and depends not only on the nature of the research and the objectives it was designed to achieve but also upon their, usually implied, epistemology and ontology.

It is possible, though dangerous, to argue that in the social sciences there exist hierarchies of understandings. At the “base” there are very detailed descriptions of particular events and the entities that are involved. But these descriptions are not usually generalisable. At the “summit” there are grand theories which explain, in some sense according to particular ontological / epistemological schools of thought, the descriptions that are provided by the detailed descriptions of “base” research. However it would be difficult to argue that, in the social world, there are any such general theories of quality.

This particular problem has been recognised for many years. In sociology for example Merton was one of the first to acknowledge that there was merit in developing “Theories of the mid range” “Such theories of the middle range consist of sets of relatively simple ideas, which link together a limited number of facts about the structure and functions of social formations and suggest further observations. They are theories intermediate to comprehensive analytical schema and detailed workaday hypotheses” (Merton, 1957). More recently there has developed a school of sociology that seeks to conceptualise and deploy what they term social mechanisms (Hedstrom and Swedberg, 1998.) To date there are over 500 citations of the Hedstrom and Swedberg book across many different social science fields. The concept of causal mechanisms has even been used in research in the IMP group (Tikkanen et al. 2010)

In this paper we describe the birth and development of the Causal Social Mechanism movement and proceed to a set of definitions. Next there is a section in which various possible ontologies are judged in terms of their compatibility with the concept. Examples of a wide range of Causal Social Mechanisms are then described and examples of those we judge may be relevant to Industrial Networks.

INTRODUCTION

The IMP group has over the years tradition produced a multiplicity of different kinds of publications. They contain data, information, knowledge, concepts, stories, models, case studies, frameworks and even theories. All this research is carried out, one would hope, in order to better our understanding of industrial networks and how they work. It is hardly surprising that the character and value of those understandings varies enormously and depends not only on what the research was designed to illuminate but also upon the epistemology and ontology, whether explicitly or stated or merely implied.

One could argue that in the social sciences there exist understandings at different levels of generality. At the bottom come thorough descriptions of particular events. However these descriptions do not usually to other situations. At the other extreme there are grand theories which are said to explain the descriptions that are provided by the detailed descriptions of “base” research. However few researchers would argue that in social situations there are very many theories of this type.

However Merton, In sociology, was a pioneer in terms of pointing out that there was merit in developing “Theories of the mid range” “Such theories of the middle range consist of sets of relatively simple ideas, which link together a limited number of facts about the structure and functions of social formations and suggest further observations. They are theories intermediate to comprehensive analytical schema and detailed workaday hypotheses” (Merton, 1957). More recently there has emerged a school of sociology that argues for research into, and the creation of, what they term social mechanisms (Hedstrom and Swedberg, 1998.) Their work has attracted over 500 citations across many different social science fields. The concept of causal mechanisms has even been seen in research in the IMP group (Tikkanen et al. 2010)

In this paper we review the birth and growth of the Causal Social Mechanism movement and then put forward some definitions which attempt to capture the nature of the movement. There follows a section in which various possible ontologies are described and their compatibility with the CSM concept assessed. The main body of the paper is devoted to examples of a wide range of Causal Social Mechanisms and the paper concludes with a set of examples of those we judge might be relevant to Industrial Networks.

BIRTH AND GROWTH OF A MOVEMENT

Robert Merton is generally regarded as being the contemporary originator of the notion of Causal Social Mechanisms although he stood on the shoulders of early giants in the field of sociology including Weber, Talcott Parsons and Durkheim. His first mention was in a paper devoted to the discussion of role theory. “The basic problem, which I deal with here, is that of identifying social mechanisms, that is, processes having designated effects for designated parts of the social structure which serve to articulate the role-set more nearly than would be the case, if these mechanisms did not operate” (Merton, 1957 p.111). In the next year Karlsson published a widely reviewed book entitled “Social Mechanisms: Studies in Sociological Theory”. He wrote “We want to find social mechanisms that make society work and we want to describe these mechanisms adequately” Karlsson (1958). However the mechanisms identified would now be regarded as being more akin to models, often mathematical, rather than mechanisms as they came to be known. Merton later positioned the concept of causal social mechanism within the class of theories which he labelled Theories of the Middle Range, “...theories that lie between the minor but necessary working hypotheses and that evolve in abundance during day to day research and the all inclusive systematic

efforts to develop a unified theory that will explain all the observed uniformities of social behaviour and social change” (Merton, 1968 p39). He added “Middle range theory involves abstractions, of course, but they are close enough to observed data to be incorporated in propositions that permit empirical testing “(ibid).

In the succeeding years there were a number of references to social mechanisms in various social disciplines but the term was generally used in a rather imprecise way. For example Robbins, a French social historian, wrote “A broadly expanded electorate of militiamen using legally guaranteed social mechanisms of polling advanced combative merchants and artisans to powerful posts on the reconstituted town council, displacing royal jurists and patricians” (Robbins, 1995). Closer to home, Jones et al, in the *Academy of Management Review*, examined the network form of governance and argued that particular “... exchange conditions drive firms toward structurally embedding their transactions, which enables firms to use social mechanisms for coordinating and safeguarding exchanges” (Jones et al. 1997, p924). Muntaner pointed out a related problem and one that occurs in many applied sciences, in this case epidemiology research. “A plausible reason for the lack of explanations in social epidemiology is the attachment to an empiricist philosophy that searches for empirical generalizations (e.g., using observations to build models) while avoiding conjectures about the underlying social mechanisms that would help us understand how social systems work” (Muntaner, 1999). However what was largely absent from most of these usages of the term social mechanism was the particular combination of causal and social in the works published during this period.

In spite of Merton’s prominence, the idea that mechanisms should occupy a central place in social theory did not immediately catch on in sociology and little effort was dedicated to clarifying the notion (Hedstrom and Swedberg, 1998, p 6). Consequently, during this period, the philosophical literature on social mechanisms is not very extensive, being mostly due to a handful of authors (cf. Elster 1983, 1985, 1989; Stinchcombe 1991; Little 1991, 1998). However, in the late 90s there was a revival of interest in the topic (cf. Hedstrom and Swedberg 1996, 1999), and the renewed interest in social mechanisms has had some influence on actual research (cf. Brochmann and Hammar 1999, 19-20).

The key paper which might be said to have initiated the current interest in Causal Social Mechanisms was published by Hedstrom and Swedberg in 1996, almost 30 years later than Merton’s original work. They wrote “Drawing on the heritage of Robert Merton and James Coleman, it is argued that the essential aim of sociological theorizing should be to develop fine-grained middle-range theories that clearly explicate the social mechanisms that produce observed relationships between explanans and explanandum” (Hedstrom and Swedberg, 1996, p281). They further argued that “Even though the concept of 'social mechanisms' is occasionally used in the sociological literature, it has received little systematic attention. Our main ambition with this article is therefore to examine more closely the notion of mechanisms in an attempt to evaluate its potential role in explanatory sociological theory” (op cit).

They followed the paper with a book in 1998 which was widely reviewed, generating over 600 citations and it could be said to be the stimulus which led to the birth of a new sociological movement. In the introduction the authors state “The main message of this book is that the advancement of social theory calls for an analytical approach that systematically seeks to explicate the social mechanisms that generate and explain observed associations” (Hedstrom and Swedberg, 1998, p1). One reviewer subsequently wrote “These words begin one of the most important books published this decade. These essays, by several of the most versatile and original social scientists of

our age, call for a rebirth of "orthodox" social science (Anon, American Journal of Economics and Sociology, 1999). Another reviewer wrote "...the contributors to the volume form a distinguished group of sociologists, economists, and political scientists. I am not invoking authority in a superficial way here. Instead, I simply suggest that we ought to listen to colleagues whose own research—some quite recently, others over the course of several decades—sets standards that are very difficult to match. In the end, this initial presumption is born out. The message that the contributors convey is, taken as a whole, very persuasive" (Johnson, American Journal of Sociology, 1999, p1895).

In the last 12 years there has been a massive growth in the field which has now been labelled Analytical Sociology. This is a somewhat unfortunate label since it suggests a narrow approach to a philosophical position which is fundamental to all research and theorising.

Three recent works provide a comprehensive picture of what has become a vigorous but also complex field. These are the Hedstrom and Bearman (2009), Hedstrom and Ylikoski (2010,) and Demeulenaere (2011). Hedstrom and Bearman's handbook is encyclopaedic in its coverage and comprises 30 chapters in 4 sections. It begins with a reiteration and extension of Hedstrom's basic position. The second section deals with social actions and interactions at the most basic level as its title suggests; Social Cogs and Wheels. The third section is devoted to discussion of aspects of the macrodynamics which result from the microfoundations of cogs and wheels. In the fourth section "... we ask authors from other areas of social science to consider how analytical sociology relates to their programs". In 2010 Hedstrom and Ylikoski published a review in the Annual Review of Sociology which offers a brief (compared with the books) summary of the basic tenets of Analytical Sociology. The most recent book is by Demeulenaere (2011) and it is again an edited work. It features some of the same contributors as the previous two works and is complementary to them. It "... offers a series of reflections upon the main theme, which is that of social mechanisms."

Finally, Gross offers an observation about Causal Social Mechanisms and its position with respect to the study of Sociology. "As criticisms mount, sociologists grasp for more adequate conceptions of the disciplinary enterprise. Moralistic and political understandings have attained new popularity (e.g., Burawoy 2005; Feagin and Vera 2008), but many researchers with more strictly explanatory aims have embraced the postpositivist position that sociology should center on identifying more or less general social mechanisms, or abstract causal processes, that may operate in particular settings and that may help to account for observed outcomes "(Gross, 2009)

DEFINITIONS

There have been a variety of definitions of Causal Social Mechanisms and some of the most popular have been collected by Hedstrom and Ylikoski (2010).

Table 1 Alternative Mechanism Definition

Bechtel & Abrahamsen	A mechanism is a structure performing a function by virtue of its component parts and component operations and their organization. The orchestrated functioning of the mechanism is responsible for one or more phenomena. Bechtel & Abrahamsen 2005; Bechtel 2006, 2008
Bunge	A mechanism is a process in a concrete system that is capable of bringing about or preventing some change in the system. Bunge 1997, 2004

Glennan	A mechanism for a behavior is a complex system that produces that behavior by the interaction of several parts, where the interactions between parts can be characterized by direct, invariant, change-relating generalizations. Glennan 2002
Machamer, Darden And Craver	Mechanisms are entities and activities organized such that they produce regular changes from start to finish. Machamer et al. 2000, Darden 2006, Craver 2007
Elster I	A mechanism explains by opening up the black box and showing the cogs and wheels of the internal machinery. A mechanism provides a continuous and contiguous chain of causal or intentional links between the <i>explanans</i> and the <i>explanandum</i> . Elster 1989
Elster II	Mechanisms are frequently occurring and easily recognizable causal patterns that are triggered under generally unknown conditions. Elster 1999
Hedstrom	Mechanisms consist of entities (with their properties) and the activities that these entities engage in, either by themselves or in concert with other entities. These activities bring about change , and the type of change brought about depends on the properties of the entities and how the entities are organized spatially and temporally. Hedstrom 2005
Little	A causal mechanism is a series of events governed by law-like regularities that lead from the <i>explanans</i> to the <i>explanandum</i> . Little 1991
Woodward	A model of a mechanism (<i>a</i>) describes an organized or structured set of parts or components, where (<i>b</i>) the behavior of each component is described by a generalization that is invariant under interventions, and where (<i>c</i>) the generalizations governing each component are also independently changeable, and where (<i>d</i>) the representation allows us to see how, by virtue of (<i>a</i>), (<i>b</i>), and (<i>c</i>), the overall output of the mechanism will vary under manipulation of the input to each component and changes in the components themselves. Woodward 2002

The definitions are relatively similar although using different words to describe the same or similar concepts. They also, to some extent, emphasise different aspects of Causal Social Mechanisms. It is helpful to analyse the verbs describing what the Causal Social Mechanisms actually do. The list includes; responsible for, brings about or prevents, produces, provides, triggers, leads from and behaviour. The variety of action verbs is almost certainly a function of the necessarily general nature of the definition of Causal Social Mechanisms since the outcomes are, by definition, achieved through a vast variety of different means.

ONTOLOGY

While the Causal Social Mechanism version due to Hedstrom and his followers has clearly been the very influential in the field it is by no means the only account. Gross (2009) offers a critical taxonomy

of alternative ontologies. In doing so he helps to define the boundaries of what Causal Social Mechanisms might be. However he begins his paper with a critique of positivism, the arch enemy of the concept of Causal Social Mechanisms.

Positivism

“In recent decades, sociological positivism—the view that sociology should aim to identify universal causal laws of social life—has been subject to withering critique.” “Critics point out its philosophical naiveté with regard to distinctions between facts and values, observation and theory, and proof and persuasion—a problem sociological positivism shares with positivism as a more general philosophy of science. Scholars also note that in more than a century of sociological research, few universal laws have been discovered.” (Gross, 2009, p238).

Clearly, Causal Social Mechanisms play no part in the typical positivist mode of statistical correlational analysis despite the casual use of the word causal that often occurs in descriptions of the results of such work. For example; “This study identifies social mechanisms that might help prevent youth from being involved in driving under the influence of alcohol (DUI) and riding with drinking drivers (RWDD).Structural equation modeling analyses showed that DUI and RWDD were strongly related to drinking in unstructured situations, modeling of DUI by peers and parents, and perceived peer approval or disapproval of DUI” (Chen et al, 2008).

This practice is generally termed the covering law or the deductive-nomological model (or D-N) and is entirely deductive in terms of ontology.

Correlation does not and cannot be used to identify mechanisms although mechanisms may, sometimes, lead to correlation among measures of the elements of the mechanism. As Renate comments “Use of this term (social mechanism) is the hallmark of an approach that is critical of the explanatory deficits of correlational analysis and of the covering-law model, advocating instead the causal reconstruction of the processes that account for given macro-phenomena” (Renate, 2003). Pickel (2004) summarised the position of Bunge, one of the main proponents of Causal Social Mechanisms, with respect to gratuitous quantification. “Bunge is opposed to anti-science positions, but he is equally critical of pseudo-science. The latter is illustrated in his discussion of quantification and measurement—a gem for those easily intimidated by social scientists wielding sophisticated mathematical methods. Bunge’s report on instances of “pseudoquantification” includes examples from the work of Vilfredo Pareto, Samuel Huntington, Gary Becker, and James Roseau (1999, 79-82).” Pickel (2004, p).

In his later work Bunge was even clearer “Researchers in all fields dealing with reality wish to explain facts once they have described them. The prevailing account of explanation in the philosophical literature is the “covering law model”. “According to this opinion, to explain a fact is to deduce the proposition(s) describing it from a theory together with the appropriate data, such as initial conditions. This is not how explanation is conceived of in the advanced factual sciences. In these, to explain a fact consists in unveiling the mechanism that makes the thing in question “tick” (Bunge, 2010). Elster has similar misgivings. “First, causal explanations must be distinguished from true causal statements. To cite the cause is not enough: the causal mechanism must also be provided, or at least suggested; Second, causal explanations must be distinguished from assertions about correlations; .. “. He also adds further warnings “...Third, causal explanations must be distinguished from assertions about necessitation; Fourth, causal explanations must be distinguished from story-telling; and finally, causal explanations must be distinguished from predictions. Sometimes we can

explain without being able to predict, and sometimes predict without being able to explain" (Elster 1989:4-8) in H and S.

Non Positivist Ontologies

Gross argues that the nature of mechanisms has not been clearly theorised. "Confusion abounds as to what exactly a mechanism is. A clear definition is an essential first step toward a sociological theory of mechanisms. To distil such a definition, I consider five (actually 6) varied conceptualizations that have appeared in recent years" (Gross 2009, p359)".

"Mechanisms as not necessarily observable structures or processes".

Hedstrom and Swedberg (1998) developed this view of mechanisms and it has been briefly discussed above. This ontology requires that a social structure or process must lead to action and that it should be explained by as full a specification of its internal workings as possible. However strict realism is not required and, crucially, the social mechanism involved need not be observable.

Also individuals should be assumed to adopt rational choice practices. For example Tyler Cowen (1999) was quoted by Steele who "...writes, "I interpret social mechanisms . . . as rational-choice accounts of how a specified combination of preferences and constraints can give rise to more complex social outcomes" (Steele, 2004). Hedstrom was certainly a proponent of rational choice and probably remains so. "By spelling out a detailed mechanism linking individual behavior and rewards, the rational-choice theory provides a deeper and more fine-grained explanation than behaviorist theory" (Hedstrom and Swedberg, 1996). However in a footnote to the Introduction of the Hedstrom and Bearman book (2009) it states "The focus on actors and actions suggests to some that analytical sociology is a variant of rational choice theory. This is not necessarily the case however. Although some analytical sociologists are rational choice theorists, others are not" (Hedstrom and Bearman, 2009). The choice of contributors to the book certainly supports this assertion.

"Mechanisms as observable processes that do not require the positing of motives."

"Unlike Hedström and Swedberg, Reskin argues that *how* questions must be answerable in terms of observable processes; in her view, this feature commends them over *why* questions from the standpoint of realism, for the motives of individuals and groups typically cannot be seen. " In other words motives and other unobservable entities happen "inside the black box of social causality" and are more concerned with "how" level of question rather than the ultimate "why".

"Mechanism as lower order social processes".

The third school of thought is due to Stinchcombe who defines mechanisms as "... bits of 'sometimes true theory' or 'models' that represent a causal process, that have some actual or possible empirical support separate from the larger theory in which it is a mechanism, and that generate increased precision, power, or elegance in the large-scale theories." This might be regarded as the jigsaw route to explanation.

"Mechanisms as transforming events."

Mechanisms-based approaches, due to Tilly by contrast "select salient features of [historical] episodes and explain them by identifying robust mechanisms of relatively general scope" (Tilly, 1998, p. 569). They "are events that alter relations among some specified set of elements," and they come in three varieties: "cognitive mechanisms operate through alterations of individual and collective perception"; "relational mechanisms alter connections."

Gross's Theory of Mechanisms

Gross offers his own Pragmatist prescription. "I argue that social mechanisms—the nuts and bolts processes by which cause and effect relationships in the social world come about—are best thought of as chains or aggregations of problem situations and the effects that ensue as a result of the habits actors use to resolve them." In typical pragmatic mode emphasis is placed upon the problems to be solved and the issues to be resolved rather than simply understanding why certain events have turned out as they have. In particular "Sociology should aim to identify the main social mechanisms by which cause and effect relationships in the social world that are of moral, political, or intellectual importance come about. This entails breaking complex social phenomena into their component parts to see how aggregations or chains of actors employing habits to resolve problem situations bring about systematic effects." (Gross, 2009)

"Mechanisms as triggerable causal powers".

Finally, while there are aspects of the previously reviewed schools of thought with which we concur, we would argue they are largely those which are consistent with a Critical Realist approach. Critical Realism and its conceptualisation of Causal Social Mechanisms provide, we believe, the most appealing approach to the understanding of Social Causal Mechanisms.

Gross's label is somewhat misleading since the triggering aspect of Critical Realism is perhaps its least important property since triggering is generally the kind of process that occurs all the time and everywhere. What is more important is how events are caused. This crucial point is summed up by Sayer. "To ask for the cause of something is to ask what "makes it happen", what "produces", "generates, "creates" or "determines" it or, more weakly, what enables or leads to it" (Sayer, 2004 p104). "On the realist view, causality concerns not just a relationship among discrete events ("Cause and Effect") but the causal powers and liabilities, or more generally their ways of acting or mechanism" (Sayer, p105). For any entity, "A mechanism is "that aspect of the structure of a thing by virtue of which it has a certain [causal] power" (Collier 1994, p62).

Entities can be any actor, human or non human, that has powers (and liabilities) to make events take place in the real world through the agency of mechanisms some of which will be unique and some routine. Such events are experienced by human actors in the "empirical" world which offer some view of the "actual" world but which were created in the real world "wherein lie the causal mechanisms—usually unseen—by virtue of which one event causes another" (Gross, 2009). It is also important to note that Critical Realists accept that "...outside the laboratory mechanisms almost always coexist with a host of other mechanisms, processes, and factors that inhibit that triggering or otherwise interfere with the causal relationship " (Gross , 2009). In this view they are at one with the "Mechanism as lower order social processes" school of thought. However "Unlike methodological individualists, critical realists are also emergentists who argue that higher-order strata of social reality emerge out of lower-order ones, and that events within those emergent strata are caused by mechanisms unique to them and not reducible to lower order mechanisms" (Gross, 2009).

Emergence

A key issue in respect of all the above ontologies is what might be called emergence. It asks the question whether and how entities at one level of "generality" come to relate to another. The classic exemplar of this is the position of methodological individualism. Advocates of this view argue that explanations should be made only by reference to the actions of the individual human actors

involved. For example “Analytical sociology explains by detailing mechanisms through which social facts are brought about, and these mechanisms invariably refer to individuals’ actions and the relations that link actors to one another (Hedstrom and Bearman, 2009, p4). More generally “KGA explanation starts with the individual agent even though it may be permissible to introduce more collective concepts, such as organization structure, in the analysis as shorthand. This implies modelling (i.e. making specific assumptions about) individual agents’ preferences, knowledge, incentives, etc. This emphasis on individualistic foundations is an attempt to meet the lacunae left in the knowledge movement by the overriding emphasis on collective constructs” (Foss, 2007). The Microfoundations approach starts from the opposite direction. “By “reductionism” is understood the explanatory position that the best understanding of a complex, and in social science, collective-level, phenomenon ... should be sought at the level of structure, behaviour and laws of its component parts plus their relations” (Silberstein, 2002: 81). It entails a search for the “deep structure” underneath aggregate phenomena” Foss (2009).

Udehn and Bunge offer reconciling approaches. “It is common to categorize social scientific theories as either individualistic or holistic, and to assume that they are opposites. This neat picture is not so much wrong as too simple” (Udehn, 2002). “Thus, from the systemist point of view, every system entails composition, environment, and structure, with macro-macro, macro-micro, micro-micro, and micro-macro linkages that specify functional form (i.e., step level, linear, curvilinear, etc.). By contrast, the usual articulation of theory is either through holism or reductionism. Holism focuses exclusively on macro-level connections, and reductionism includes only micro linkages, so each is inherently incomplete. In sum, systemism is distinguished from “garden variety” approaches toward theorizing as a result of its insistence upon completeness” (James, 2004). In other words there can be approaches which combine both points of view.

EXAMPLES OF CAUSAL SOCIAL MECHANISMS

There are many examples of what might be, or could be construed as, Causal Social Mechanisms. They can sometimes be derived from what might be called everyday experiences and their explanations or else they can be the results of research findings.

Physical Sciences

In the physical sciences the systems studied are much more likely to yield evidence of causal mechanisms. In “Evidence is presented from kinetic and product studies that the first step in the one-equivalent oxidation of the enol of cyclohexanone by the hexachloroiridate(IV) anion is an outer-sphere electron transfer which gives rise to the hexachloroiridate(III) anion and a 2-oxocyclohexyl radical. The latter then reacts with a further iridate (IV) ion by an inner-sphere (*i.e.*, ligand transfer) mechanism, to give 2-chlorocyclohexanone and aquopentachloroiridate (III)”. Cecil, Littler and Easton, (1970).

Animals

Most living creatures exist among their own kind and interact with them. Relatively simple forms of “social behaviour” can therefore be expected. For example Brown and Warburton studied the learning behaviour of fish in shoals when confronted with novel structures of trawl apparatus fishing nets. It was discovered that “Fish in shoals of 5 found, and escaped through, a hole in the oncoming trawl more quickly than fish in pairs. Fish in the larger shoals displayed a significant decrease in escape latencies over a series of five trawls, providing clear evidence of net avoidance learning, whereas fish in pairs showed no evidence of learning over successive runs. Observations suggested

that more information on the location of the escape route was available to fish in larger shoal sizes, owing to social stimulation" (Brown and Warburton 1999). A greater number of fish meant that loopholes were more readily discovered and social imitation, of a very simple form, resulted in the shoal escaping.

Geist (1964), studied sheep and moose behaviour in relation to the ranges on which they grazed and used the language of Causal Social Mechanisms to describe the results. "In contrast to moose, yearling sheep are drawn towards the population centre by social mechanisms. Habitat retention depends in moose on yearling dispersal and high reproductive rate, but in sheep on a living tradition and the sheep's social system.

Societal

An example of a societal issue is that of "...the phenomenon of trained individuals out-qualifying the less educated in job competition". Solga argues that mechanism involves 'stigmatization by negative selection' because firstly there are fewer less educated people but also that the quality of those involved is lower than previously. "The main argument is that following educational expansion, employers increasingly trust the sorting function of schools and teachers' evaluation, resulting in an exclusion of the less well educated." Solga (2002)

Pinkster (2007) researched low-income neighbourhoods in the Netherlands to study the question of "...of which social mechanisms in the daily life of residents might contribute to reduced social mobility in the long run." The answer appeared to be a combination of limited opportunity structures and negative socialisation processes. However, these mechanisms were moderated by the particular socio-spatial context so that both positive and negative effects were experienced.

Another example is provided by Bunge. "Thus, by contrast with the subsumption of particulars under a generalization, an explanation proper consists in unveiling some lawful mechanism, as when political stability is explained by (either) coercion, public opinion manipulation, or democratic participation. Finding mechanisms satisfies not only the yearning for understanding, but also the need for control" Bunge (2004).

The anthropologist Malinowski's was interested in trying to understand, among the Trobriander islanders, how having more wives was a cause of increased wealth among Trobriand chiefs. The mechanism was, in part, the result of a custom that men were required to make substantial annual contributions of yams to the households of their married sisters. The more wives a man had the more yams he would receive and since yams equated to currency they allowed the recipients to spend or invest as desired. This was also an example of one of research process that can be used to elucidate mechanisms; that of process tracing.

Networks

The "small world" model of Milgram suggests that while most people have largely strong and dense local connections an actor can, via a very few links, connect to any another actor in the world. The mechanisms here is that highly connected local ego clusters are connected by a relatively few random inter cluster links. However this is effectively a communication network and wouldn't necessarily work with information or any other form of resource exchange (Milgram, 1967).

Government

Barzelay and Gallego (2010) suggest that in the study of government, attribution of opportunity can be regarded as a social mechanism. This can be characterised as "...that conduct is influenced by how actors use each other's responses to a situation as a source of information about the opportunities they face, individually and collectively." An alternative, or perhaps additional mechanism suggested is actor certification. "A defining aspect of this explanatory device is that it demands that an analyst explain how situational conditions—stationary and transitory—influence actors' properties, such as the way their identities come to be framed."

Organizations

Lazega (2001) carried out an in depth study of a US law firm in order to examine the ways in which peers in the firm cooperated. Partners and associates established social niches in order to provide micro structure and allow specialisation. Although most resource ties exist with niches, some of them crossed niche as well as firm boundaries in order to provide access to resources to carry out their activities. Lazega was able to identify 3 social mechanisms that appeared to be operating within the firm; bounded solidarity, lateral control, and oligarchic regulation.

In Juillerat (2010) a claim is made that "...this paper contributes to the macro organizational theory literature by integrating organizational theory with the study of work (Barley & Kunda, 2001) and elaborating underlying "mechanisms" (Hedstrom & Swedberg, 1996) through which organizational structure influences individual and organizational outcomes, such as individual work characteristics (Hackman & Oldham, 1976; Oldham & Hackman, 1981) and cognitive processes. One example of such a claim is that "Formalization and job characteristics (autonomy, job complexity, interdependence, and time pressure) will interact synergistically to influence proficiency through mindfulness mechanisms such that the positive relationship between job characteristics and proficiency will be stronger when formalization is high."

Baden – Fuller and Morgan (2011), in a recent review of Business Models, argue that Business Models "... act as various forms of model: to provide means to describe and classify businesses; to operate as sites for scientific investigation and to act as recipes for creative managers". Of these the second is the most relevant here. "However the discussion of the "scientific" approach to Business Models is based largely on economics and biology. As a result it privileges approaches to the subject in terms of a dichotomy between conceptual generic models, often mathematical, or "... study on a set of model organisms..". What is rather lacking in this approach is any attempt to elicit the underlying causal mechanisms. In particular it seems likely that the overall performance of any organization involves a combination of different Causal Social Mechanisms and not simply one, something which is implied in the Business Model literature.

Duit (2007) studied a Swedish institution for emission control during the period 1960 – 2000 in order to discover the extent of path dependence its development. He argued that two categories of institutional reproduction mechanisms could be distinguished "...rules that 'generate' reproduction mechanisms (reproductive rules), and action patterns that 'result' from actors following reproductive rules (reproductive practices). The macro trajectory confirmed well to the punctuated equilibrium model suggesting that periods of rapid change had occurred followed by relative

stability. However despite the periods of change the institutional reproduction mechanisms appeared to have remained intact. "Thus, the punctuated equilibrium model does a good job of describing the aggregate pattern of institutional change, but fails to distinguish stability on lower levels of analysis."

Purdy and Gray (2009) studied the evolution of a new population of institutions, state offices of dispute resolution, and claimed to have discovered four mechanisms by which the practices of the institutions concerned were diffused among the population. They were transformation, grafting, bridging, and exit. Which operate in particular circumstances depended upon the interaction among entrepreneurial efforts, strategic responses to resource dependencies, and mechanisms of institutionalization.

Individuals

There are a whole series of mechanisms which are deemed to help explain particular kinds of individual behaviours. One of the earliest of these described in sociology is the "self fulfilling prophecy". Merton was the first to conceptualise the mechanism involved, described as the Thomas Theorem. "If men (sic) define situations as real, they are real in their consequences" (Merton, 1938, p 331). The classic example is a run on a bank. If individuals begin to believe that a bank cannot meet its obligations they will try to withdraw their deposits which will then confirm the belief as well as actually reduce the deposits and the bank will fail.

A second somewhat similar mechanism codified by Merton is the so called Matthew effect. It is clearly set out in Matthew's gospel. "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath." (St James bible, Matthew ch25, v29). It captures the notion that access to resources is, in itself, a means by which more resources can be accessed and is known as the cumulative advantage process. In theory it can lead to skewed distributions across individuals in terms of not only money and possessions but also social standing and reputation. "He is famous for being famous".

Counterwishful thinking is the opposite of wishful thinking and is known as the "Othello effect". For example we ignore all the faults of the ones we love on the one hand but on the other, may also believe that the ones we love are unfaithful to us. It requires believing that things are worse than they actually are and is a process of dissonance production which can be contagious and occur within and across populations.

Gigerenzer and his colleagues have carried out research over the years which strongly suggest that the rational thinking through model of human information processing is not used in every situation. Instead simple heuristics, such as the minimalist heuristic and the recognition heuristic are used. ((Gigerenzer, Todd and the ABC Group (1999). In more complex situations experience may be used by recognising patterns in particular situations which have been experienced previously and choosing actions which have had successful outcomes (Kahneman and Teversky (1982); Gilovich, Griffin, and Kahneman (1991)).

Matching is clearly an important process in social situations, organizations and markets. Stovel and Fountain argue that while matching is governed by preferences they should not be regarded as fixed

and exogenous. They suggest that "...there are 3 important facets of matching processes: that matches are constrained by others preferences, the strength of local rules about the importance of being matched and the costs of decoupling". Each of these factors may cause actors to come to prefer that to which they are available to them (Stovel and Fountain (p385) In Hedstrom and Bearman (2009).

INDUSTRIAL NETWORKS AND CAUSAL SOCIAL NETWORKS

A key question is how can the concept of Causal Social Mechanisms help research and theorizing in the IMP world? IMP research, as with any other research field, has special characteristics and subsequently requirements which need to be considered before that question can be answered. The first consideration is that the field is essentially interorganizational in character even if a great deal of our research is within one or a few organizations. As such it is macroscopic in nature though what we observe at that level is clearly a function of a myriad of factors at many different levels of aggregation. Put another way, there are, in terms of actors, both one to many (network to dyads to organizations to departments to individuals) and many to one (individuals to departments to organizations to dyads to networks) relationships to be understood. It seems obvious that very often Causal Social Mechanisms are going to have to have both emergent and devolved characteristics. Indeed it may be that they will, or perhaps should be, largely of that kind. In other words Causal Social Mechanisms may be required to help explain what the outcome of interaction of certain entities will be at some more aggregated (or disaggregated) level of analysis. In the former case what we will be doing is to try to understand the bottom up, emergent properties of the systems we research. In the latter it would be a top down process. In what follows we will deploy examples of Causal Social Mechanisms, already discussed previously, which might usefully be modified and used to help provide Industrial Network explanations.

Application of Existing Causal Mechanisms to Industrial Networks

The fish example, remote though it might seem, suggests that the greater the number of strong, sharing relationships organizations have the more likely they are to be able to sense pathways that will be beneficial for them. However this also requires that the organizations are prepared to imitate and follow the crowd so the analogy might be limited to buyer seller relationships rather than all network relationships.

Solga's mechanism of 'stigmatization by negative selection' involved employers increasingly trusting "the sorting function of schools and teachers' evaluation, resulting in an exclusion of the less well educated." In terms of Industrial Networks this can be translated into situations where there are actors whose function is to qualify organizations (standards authorities), where buyers "give a dog a bad name" or within buying or selling organizations individuals "sort and evaluate" to the good or ill of other actors in the system.

Bunge suggested that political stability is explained by (either) coercion, public opinion manipulation, or democratic participation. For political stability read network stability. Thus a network could be stabilised by coercion by a powerful actor or actors. Similarly third parties, perhaps final customers could bring pressure to bear. Democratic participation could be seen as a situation where all the network actors are more or less equally powerful and so that there is a power balance overall.

The Malinowski example was created by the research technique of process tracing. As a result an unexpected network mechanism was identified. The wealth of male Trobriander islanders depended on a custom whereby men were required to make substantial annual contributions of yams to the households of their married sisters. This is a good example of effect at a distance in a network.

The “small world” model of Milgram suggests that while most people have largely strong and dense local connections an actor can, via a very few links, connect to any another actor in the world. The mechanism here is that highly connected local ego clusters are connected by a relatively few random inter cluster links. However this is effectively a communication network and wouldn't necessarily work with information or any other form of resource exchange (Milgram, 1967).

Baden – Fuller and Morgan (2011), in a recent review of Business Models, argue that Business Models “... act as various forms of model: to provide means to describe and classify businesses; to operate as sites for scientific investigation and to act as recipes for creative managers”. Of these the second is the most relevant here. “However the discussion of the “scientific” approach to Business Models is based largely on economics and biology. As a result it privileges approaches to the subject in terms of a dichotomy between conceptual generic models, often mathematical, or “... study on a set of model organisms..”. What is rather lacking in this approach is any attempt to elicit the underlying causal mechanisms. In particular it seems likely that the overall performance of any organization involves a combination of different Causal Social Mechanisms and not simply one, something which is implied in the Business Model literature.

Duit (2007) argued that there were two categories of institutional reproduction mechanisms; rules that ‘generate’ reproduction mechanisms (reproductive rules), and action patterns that ‘result’ from actors following reproductive rules (reproductive practices). In other words new rules were imposed from outside and while change occurred, the institutional reproductive mechanisms were largely unaffected. The same might well be true in Industrial Networks. While major changes occur in the macro environment (e.g. a takeover of a competitor or new legislation) the underlying reproductive mechanisms could still remain.

The concept of self fulfilling prophecy could quite easily describe some Industrial Network dynamics. Any perceived possible change in, for example, technology, market structure or legislation, if plausible, could lead to network actors taking steps to meet the change which would then lead to the change becoming much more likely. Similarly the Matthew effect implies that the possession of a great deal of any kind of valuable resource is likely to make acquisition of more of it more likely. This could apply, in Industrial Networks, to number of customers, access to technology or finance or favourable network positions.

In terms of individual psychology, Gigerenzer et al have shown that we do not necessarily make complex judgements in situations of low importance and act as cognitive misers. Since Industrial Networks are complex and dynamic, actors may be forced to make judgements in situations perceived as marginal based upon very little information. Similarly have a great deal of experience about more important situations could lead actors to base decisions on, for example, existing customer situations or past experience rather than on more thoughtful assessments.

Matching is central to all marketing. Stovel and Fountain argue that there are 3 important facets of matching processes. The first is that matches are constrained by others preferences, in the case of Industrial Networks these are likely to involve alternative network partners. The second is the strength of local rules about the importance of being matched and that has to do with local market practices. The third is the costs of decoupling, which in the Industrial Network case where strong, long term relationships are common, is likely to be crucial”.

The “tragedy of the commons” Causal Social Mechanism is a dilemma which arises, in theory, from a situation in which multiple self interested actors, acting independently and rationally consulting undertake actions will lead to the destruction of valuable resources which they have access to. This will happen even if the actors are fully aware of the likely consequences of their action. The original paper was written by Garrett Hardin (Science, 1968) and refers to an idealised version of the possible outcomes of cattle on common pasture. The key point is that any commoner can graze their stock on the common. Since there is no constraint on grazing it pays each and every one of them to graze as many cattle as possible assuming that they have access to capital to pay for them. In doing so they will ultimately overgraze the land and the result will be starvation of the cattle. In practice there are many ways in which this ideal model fails to mirror reality. However the underlying process, even working only partially as described, seems to be one that could have major application in Industrial Networks. It reflects, in part, the law of diminishing returns where competition for resources is also involved. Take the example of customers; the more producers in a market the more likely it is that each tries to gain business and lock them in to long term relationships. But as more and more effort is devoted, by all the businesses in a market, to gaining and keeping customers the less profitable each becomes. Moreover the lower the industry barriers to entry are and the easier it is to change suppliers the more likely it is that the market will become highly competitive and hence profits will be marginal at best.

A very interesting example of a particular mechanism is the domino effect (Hertz and Mattsson, 1993, 1999). It involved the study of a reorganization of global freight forwarding industry. The industry underwent a wave of alliances, mergers and acquisitions in response to the deregulation of the market within EU in early 1990s. This led to the restructuring of the transportation systems involved and to internal reorganization and the reformation of customer relations. New relationships had to be made and old ones severed. For example, “ASG’s acquisition of IFI triggered its own exit from WACO. ASG’s former WACO partners then became ASG’s competitors so that ASG had to replace them by new partners or subsidiaries of its own in a great many in locations. When ASG left the alliance, WACO found ISA, an airfreight firm, to replace ASG for the Scandinavian destinations. After joining WACO, ISA had to switch to WACO agents around the world.” These are all examples of interrelated strategic actions to cope with evolving changes in connectivity structures. They can be viewed as chains of actions caused by “domino effects” in networks (Hertz, 1998).

Finally, there has been one IMP paper by Tikkanen et al (2010) entitled Competitive Actions and Dynamics in Project Marketing which involves Casual Social Mechanisms. While the authors review some of the Causal Social Mechanism literature and set out a model of the domain “mechanisms” involved, the actual mechanism are, unfortunately, not really specified. “Naturally, the exact content

and scope of any mechanism vis-à-vis, for instance, the action domains (project marketing process phases and the related actions) is an empirical question and falls beyond the scope of this paper.”

CONCLUSIONS

The interest in Causal Social Mechanisms has been slow to build but has now clearly reached a point where it is being considered across a wide variety of different sub-disciplines. It has developed into a complex and broad field of study and has attracted a number of significant and powerful adherents. It is very unlikely to disturb the monolithic correlational covering law paradigm. However what it does do is to provide a link between alternative philosophical positions and ways of understanding the world. In particular it fits very well with a Critical Realist approach to explanation. Critical Realism has rather struggled to become widely adopted at least partly because of the relatively stringent requirements of carrying out research which takes into account the possible causal complexity of the phenomena under study. Causal Social Mechanisms offer a bridge between the philosophical and the empirical. Instead of building up an explanation from first principles – entities, powers and liabilities etc- researchers can ask themselves by what mechanisms have the particular events that they are seeking to understand been brought to pass.

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